

REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested.

Claims 18-44 are pending in this application. Claims 1-17 have been previously canceled without prejudice or disclaimer.

The outstanding Office Action of April 19, 2005, presents a rejection of Claims 18-44 as being unpatentable over Liu et al. (U.S. Patent No. 6,451,703, Liu) or Hung et al. (U.S. Patent No. 6,387,287, Hung) in view of Lenz et al. (U.S. Patent No. 5,534,751, Lenz) under 35 U.S.C. §103(a).

Before addressing the outstanding rejection it is believed that a brief review of the claimed subject matter would be helpful.

In this regard, both aspects of the claimed invention involve providing an oxide film etching apparatus that includes a process chamber configured to maintain a vacuum environment. An upper and a lower electrode are situated opposite to each other inside this process chamber, with the lower electrode being configured to hold a target object having an oxide film formed on an upper surface thereof. Both aspects of the invention further include providing a gas inlet to introduce an etching gas containing C_4F_6 gas and O_2 gas at a particular flow rate while power supply circuitry supplies power at different frequencies to the upper electrode and to the lower electrode to generate a high frequency field there between. This generates a plasma in the etching gas introduced into the process chamber so that the oxide film of the target object is etched by this plasma generated by the high frequency field between the upper and lower electrodes in the process chamber.

In a first aspect of the invention defined by the present claims, the etching gas contains C_4F_6 gas and O_2 gas having a ratio of C_4F_6 gas to the O_2 gas within a range between 0.7 to 1.1.

In a second aspect of the invention defined by the present claims, the frequency supplied to the upper electrode is between 50MHz to 80 MHz while the frequency supplied to the lower electrode is between 1MHz to 4 MHz.

Turning to the outstanding rejection of Claims 18-44 as being unpatentable over Liu or Hung in view of Lenz under 35 U.S.C. §103(a), it is first noted that the reliance on Hung as an alternative to Liu is not understood.

In this last regard, Liu at least teaches an oxide film etching apparatus that includes a process chamber with a gas inlet that introduces an etching gas containing Ar along with C₄F₆ gas and O₂ gas at a particular flow rate into the process chamber as required by both independent base Claim 18 and independent base Claim 27. Hung only teaches an oxide film etching apparatus that includes a process chamber with a gas inlet that introduces an etching gas containing C₄F₆ gas along with Ar. While there is a later nitride etch performed using CH₂F₂ + O₂ + Ar gases, there is no teaching in FIG. 2 of Hung noted in the last line at the bottom of page 2 of the outstanding Action (or elsewhere) suggesting performing an oxide film etching with an introduction of an etching gas containing C₄F₆ gas and O₂ gas having any ratio, much less having a ratio of C₄F₆ gas to the O₂ gas within a range between 0.7 to 1.1 as specified by base independent Claim 18.

To the extent that the PTO is to continue to rely upon Hung as an alternate to Liu, it is called upon to explain where in Hung a teaching is found as to introducing of an etching gas containing C₄F₆ gas and O₂ gas having any ratio, much less having a ratio of C₄F₆ gas to the O₂ gas within a range between 0.7 to 1.1. See *In re Rijckaert*, 9 F.3d 1531, 1533, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) ("When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference.").

Furthermore, the PTO improper incorporation of Arai et al. (U.S. Patent No. 6,110,287, Arai), Welch (U.S. Patent No. 4,753,709), Flamm (U.S. Patent No. 4,918,031), Weling (U.S. Patent No. 5,522,957), O'Neil (U.S. Patent No. 5,683,538), Hung (U.S. Patent No. 6,174,451), Guinn (U.S. Patent No. 5,877,032), and Sekine (U.S. Patent No. 4,786,361) violates MPEP § 706.02(j) guidelines requiring that whenever “a reference is relied on to support a rejection, whether or not in a minor capacity, that reference should be positively included in the statement of the rejection.” The cited decision of *In re Hoch*, 428 F.2d 1341, 1342 n.3 166 USPQ 406, 407 n. 3 (CCPA 1970) is further noted as setting forth that there is no known excuse for failing to include all references relied upon in the statement of the rejection.

Furthermore, *See In re Lee*, 277 F.3d 1338, 1343, 61 USPQ2d 1430,1434 (Fed. Cir. 2002) requiring the PTO to “explain the reasons one of ordinary skill would have been motivated to select the references and to combine them to render the claimed invention obvious” and the also requiring a “full and reasoned explanation” at 277 F.3d 1342, 61 USPQ2d 1432-33. Clearly no such explanations appear in the outstanding Action.

Besides improperly failing to include all of the relied on references in the statement of the rejection and failing to “explain the reasons one of ordinary skill would have been motivated to select the references and to combine them to render the claimed invention obvious” in any “full and reasoned” manner, the outstanding Action fails to explain the manner that it has been determined by the PTO that Liu teaches the Claim 18 required ratio of C₄F₆ gas to the O₂ gas (within a range between 0.7 to 1.1), much less a valid reason why the artisan would have been led to select Lenz and to attempt to modify Liu to have upper and lower electrodes that are supplied power at different frequencies to generate a high frequency field there between, much less to supply power to the upper electrode that is between 50MHz

to 80 MHz while the frequency supplied to the lower electrode is between 1MHz to 4 MHz as specified by independent base Claim 27.

While Liu teaches an oxide film etching apparatus that includes a process chamber with a gas inlet that introduces an etching gas containing Ar along with C_4F_6 gas and O_2 gas at a particular flow rate into the process chamber as required by both independent base Claim 18 and independent base Claim 27, Liu does not appear to teach the Claim 18 of C_4F_6 gas to the O_2 gas within a range between 0.7 to 1.1 and does not teach applying different frequencies to upper and lower electrodes.

Again, if the PTO is suggesting that Liu is actually teaching the Claim 18 the ratio of C_4F_6 to O_2 gas is to be within a range between 0.7 to 1.1, the above noted *Rijckaert* decision requires that the PTO point to the exact location in Liu that this teaching appears.

Moreover, it is clear that the teaching of Liu includes the use of the single electrode 38 connected to an RF power supply source operating at 13.56 MHz to provide the power to generate the plasma as described at col. 4, lines 22-25. Coils 44 are employed to then generate a slowly rotating magnetic field to increase plasma density as note at col. 4, lines 25-29. Completely missing here is the required reasoning and explanation why the artisan would then select the Lenz etching apparatus that has two electrodes supplied with different frequencies where the frequency to be applied to the work piece holding electrode is only 2 MHz to modify that of Liu. Besides these differences, there is the lack of the Liu magnetic coils 44 and the apparent need to include the dielectric slotted ring assembly 30 of Lenz to achieve the benefit of confined plasma that leads to the enhanced etch control and selectivity noted at col. 1, lines 54-63, that are relied on in the Action. The incorporation of these features from Lenz into Liu would, accordingly, entail a complete redesign of Liu and the loss of the basic operating principle of Liu. Any proposed modification that would require

such a complete redesign and change the basic operating principle of the reference is not an obvious one. *See In re Ratti*, 123 USPQ 349, 352 (CCPA 1959).

Apparently realizing that none of the references cited in the statement of the rejection teach the entirety of the subject matter of base independent Claims 18 and 27, the outstanding Action points to the improperly relied upon references (Arai et al. (U.S. Patent No. 6,110,287, Arai), Welch (U.S. Patent No. 4,753,709), Flamm (U.S. Patent No. 4,918,031), Weling (U.S. Patent No. 5,522,957), O'Neil (U.S. Patent No. 5,683,538), Hung (U.S. Patent No. 6,174,451), Guinn (U.S. Patent No. 5,877,032), and Sekine (U.S. Patent No. 4,786,361)) to suggest that various configurations of electrodes and frequencies to apply thereto and other process parameter variations have been used in the art with no showing of any motivation why such knowledge would have motivated any changes to Liu or Hung with or without considering Lenz is clearly an improper approach. *See In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) establishes that:

Further, a rejection cannot be predicated on the mere identification in [the references] of individual components of claimed limitations. Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed.

Furthermore, the claims at issue (18-44) are apparatus claims, not process claims. Thus the statement at page 4 of the outstanding Action that “[c]hanges in compositions, temperature, concentrations or other process conditions of a process do not impart patentability unless recited ranges are critical” (emphasis added) are misplaced as to apparatus claims. Moreover, while unexpected results certainly would be considered “critical,” there is no requirement for establishing unexpected results to impart patentability. Note Ratti, 123 USPQ at 352-353:

If we may extract from the foregoing what we understand to be the essence of the board's position in the matter, it is that claim 10 is not patentable, though it defines a combination which is novel over the disclosures of the references, because the claimed combination has not been shown to be any better than, or to possess any advantage over, what was known to the art.

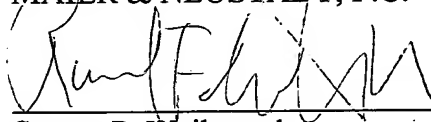
As was pointed out in *In re Stempel, Jr.*, 44 CCPA 820, 241 F.2d 755, 113 USPQ 77, an applicant is entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applies. The statutory requirements for patentability, broadly stated, are novelty, usefulness and unobviousness, as provided in 35 U.S.C. sections

101, 102, and 103. While it is true that proof that an invention is better or does possess advantages may be persuasive of the existence of any one or all of the foregoing three requirements, and hence be indicative of patentability, Congress has not seen fit to make such proof a prerequisite to patentability. [Footnote omitted].

As no other issues are believed to remain outstanding relative to this application, it is believed to be clear that this application is in condition for formal allowance and an early and favorable action to this effect is, therefore, respectfully requested.

Respectfully submitted,

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